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Remarks.

March 28.—Definition of Satellite I. not good; observation probably somewhat late. IV. growing faint at $14^h\ 37^m\ 26^s$, and I thought I could just glimpse it again at $14^h\ 39^m\ 20^s{\cdot}8$. Satellite first noted at $16^h\ 28^m\ 4{\cdot}7^s$, but I was quite certain of it 57 seconds later.

April 1.—Fair definition; satellite suspected 32 seconds before recorded time.

April 4.—Clear, but definition bad and images tremulous.

April 22.—Good definition and observation.

April 24.—Beautifully clear and definition excellent; very good observation.

May 1.—Images steady and definition excellent; good observation.

May 8.—Images steady and definition good; beautifully clear. The observation of the first appearance of II. probably rather late.

May 14.—Beautifully clear and definition good.

May 15.—Good definition, but sky overspread with thin cloud.

May 21.—Beautifully clear. Definition very good at disappearance, but images rather tremulous at reappearance. Defalcation of light marked at $7^h\ 59^m\ 45^s{\cdot}9$. Satellite suspected a few seconds before recorded time of first appearance.

May 22.—Definition excellent throughout.

May 31.—Beautifully clear and definition good.

June 25.—Definition fair at ingress, but not so good at egress.

June 26.—Images steady, and definition unusually good.

June 27.—Beautifully clear, images steady and well defined; good observation.

June 29.—Bad definition.

July 3.—Definition excellent, with clear sky.

July 4.—Clear, but with bad definition.

July 10.—Fair definition.

July 11.—Clear; definition fair, but images tremulous.

July 28.—Definition not good enough for a higher power. Satellite barely visible as a light spot at $5^h\ 29^m\ 10^s$, and quite invisible at $5^h\ 53^m\ 36^s$. At $6^h\ 32^m\ 30^s$ pretty conspicuous as a dark, not black, hazy spot; it had then nearly reached mid-transit, and was rather more than half the planet's semi-diameter distant from the planet's centre. Clouds prevented further observation.

August 8.—Beautifully clear, but with poor definition. Satellite III. suspected 10 seconds before recorded time of first appearance. Image of I. tremulous, with bad definition.

August 24.—Beautifully clear, but twilight very strong. Sun's upper limb disappeared behind the horizon $6^m\ 53^s$ before the recorded time of reappearance. Image steady and definition good.

Windsor, N.S. Wales: 1886, *Sept.* 28.

Newall's Occulter. By R. S. Newall, F.R.S.

I lately designed, and had made by a clever local optician, an addition to the eyepiece of my telescope, which I find of the greatest advantage in examining the satellites of planets and multiple stars.

My idea was to produce an instrument exactly the reverse of Dawes's solar eyepiece; that is, to interpose a screen which shall shut off the bright object, and thus allow of the faint companions being more easily seen, and, at the same time, the

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apparatus must be simple and capable of easy manipulation and adjustment.

I had my eyepieces each fitted with a *stop*, that is, a piece of tube the same diameter as the adapter, into which the eyepiece fits, and the stop is cut of such length that when the eyepiece is pushed in it shall be in the focus suited to my sight, so that I have no trouble in adjusting.

The occulter is a ring of brass, about a quarter of an inch thick and three-quarters broad. It slips stiffly on to the eyepiece as shown in the accompanying drawing. The ring is bored with three holes, as in the section, and into each is fitted an ivory sphere, three-eighths of an inch in diameter. They are held in place by brass springs, which have a quarter-inch hole in each, to admit of the movement in any direction of a small platinum wire, which passes through the sphere. On one end of the wire is a disc, and on the other a small button or handle.

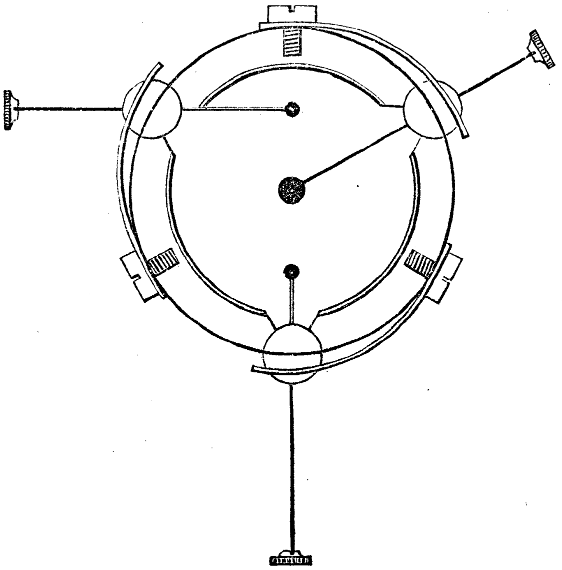

Fig. 1.

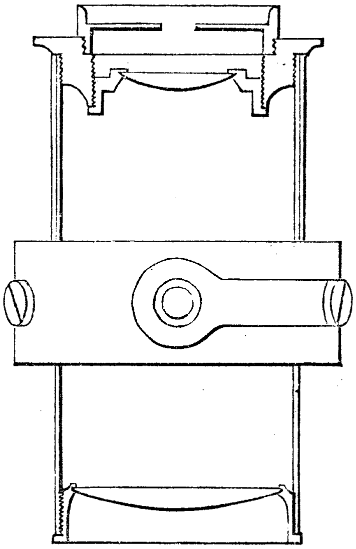

Fig. 2.

By these means the discs may be placed in any required position to eclipse the object, or they may be pushed to one side, so as to be entirely out of view; and when drawn back up to the ivory sphere the ring can be slipped off the tube, and the eyepiece is as it was, having only three holes in it corresponding to those in the ring. The centres of these holes are, of course, in the plane of the focus of the eye-lens, but the spheres allow of the discs being placed out of focus, which is sometimes of advantage. One disc would be quite enough for most work, but a spare one or two may be convenient occasionally, so I made mine with three discs slightly varying in size.

November 8, 1886.

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Distribution of Meteor Streams. By W. F. Denning.

I recently compiled a general catalogue of all the meteor streams recorded in the various publications which I collected together for the purpose. These include the observations or reductions of Backhouse, Bártfay, Corder, Denning, Denza, Greg, Gruber, Herschel, Heis, Kobold, Konkoly, Kövesligethy, Maggi, Neumayer, Sawyer, Schiaparelli, Schmidt, Serpieri, Tupman, Weiss, Zezioli, and many other minor contributors.

Mr. Greg's last Catalogue of 1876 was based on 850 radiants deduced from 15,000 catalogued meteors. At the present time we have 3,035 radiants, derived from more than 82,000 meteors. There has been an enormous increase in these observations during the last ten years.

Upon analysing all the positions, I find they exhibit a very unequal distribution amongst the constellations, a fact which is unquestionably due, partly to real differences, and, in a less degree, to the relatively excessive observations accumulated in certain months of the year. In Right Ascension the 3,035 radiant points are situated as follows:

R.A.			Radiants.	Percentage.	R.A.			Radiants.	Percentage.
°		°			°		°		
1	to	30	378	12·4	181	to	210	147	4·8
31	„	60	449	14·8	211	„	240	186	6·1
61	„	90	315	10·3	241	„	270	217	7·2
91	„	120	229	7·6	271	„	300	254	8·4
121	„	150	192	6·3	301	„	330	243	8·0
151	„	180	142	4·7	331	„	0	283	9·3

The meteor streams cluster in greatest abundance between 1° and 60° of R.A. This is a fact irrespective of the cometary showers of Andromedes (Nov. 27) and Perseids (Aug. 10), which fall in this region, and might be supposed to have induced the singular condensation referred to. The zone, following it from 61° to 90°, shows a great decline, notwithstanding it includes the Orionids (Oct. 17–20), and the mass of showers originating in *Auriga*, *Camelopardus*, and the eastern quarter of *Taurus*. And the zone, 331° to 0° preceding the region of maximum, though rich in Aquariads, Pegasids, Lacertids, and Cepheids, exhibits a great deficiency as compared with it. The excess, so decided in character, between 1° and 60° is distinctly to be attributed to the Cassiopeïds, α, β, and γ Andromedes, Arietids, Muscids, α and β Perseids, Taurids, &c., which, combined with the cometary showers of Andromedes and Perseids, swell the aggregate number to an abnormal figure.

The minimum proportion of showers is clearly indicated